Remarks/Arguments

Claims 1-78 are in the application. Reexamination and reconsideration of the present application are respectfully requested in the light of the following remarks.

Claims 1-73 and 75-78 have been rejected under 35 U.S.C. §103(a) as unpatentable over Ward et al. (WO 03/078052 A1) in view of Van Egmond (U.S. 2004/0127759 A1), and either O'Rear et al. (U.S. 6,703,429 B2) or Reyes (U.S. Patent 6,726,850), and either Brophy et al. (U.S. 7,294,734 B2) or Wainwright (U.S. Patent 4,366,260) and Tonkovich '536 (U.S. Patent 6,200,536). (Note that the lead inventor identified in Ward et al. is Ward E. TeGrotenhuis; the Examiner has referred to the reference as being "Ward et al.," and for purposes of consistency the Applicants will also refer to it as being "Ward et al."). Claim 74 has been rejected under 35 U.S.C. §103(a) as unpatentable over Ward et al. in view of either O'Rear et al. or Reyes, and either Brophy et al. or Wainwright, and Tonkovich '536 and Shikada (U.S. Patent 6,562,306). Claims 75-77 have been rejected under 35 U.S.C. §103(a) as unpatentable over Ward et al. in view of Van Egmond and O'Rear et al. and Brophy et al. and Tonkovich '536 and either one of Tonkovich '505 (U.S. 6,969,505) or Schmidt et al. (U.S. 6,452,061). These rejections are respectfully traversed.

Brophy et al. and Tonkovich '505 are not available as prior art references against the subject application in a rejection under 35 U.S.C. §103 for the following reasons. Brophy et al. is prior art against the present application under 35 U.S.C. §102(e) only due to the fact that it issued on November 13, 2007, which was subsequent to the filing date of February 11, 2004 for the present application, but was filed on May 2, 2003, which was prior to the filing date of the present application. Brophy et al. and the present application are assigned to the same company, Velocys, Inc., and were at the time the claimed invention was made owned by Velocys, Inc. or subject to an obligation of assignment to Velocys, Inc. Enclosed for the Examiner's convenience are copies of the recorded assignments for Brophy et al. and the present application, these assignments both indicating that the assignee is Velocys, Inc. Accordingly, Brophy et al. is not available as a reference against the subject application in a rejection under 35 U.S.C. §103 pursuant to the provisions of 35 U.S.C. §103(c).

Tonkovich '505 is prior art against the present application under 35 U.S.C. §102(e) only due to the fact that it issued on November 29, 2005, which was subsequent to the filing date of February 11, 2004 for the present application, but was filed on August 15, 2002, which was prior to the filing date of the present application. Tonkovich '505 and the present application are assigned to the same company, Velocys, Inc., and were at the time the claimed invention was made owned by Velocys, Inc. or subject to an obligation of assignment to Velocys, Inc. Enclosed for the Examiner's convenience are copies of the recorded assignments for Tonkovich '505 and the present application, these assignments both indicating that the assignee is Velocys, Inc. Accordingly, Tonkovich '505 is not available as a reference against the subject application in a rejection under 35 U.S.C. §103 pursuant to the provisions of 35 U.S.C. §103(c).

The various combinations of Ward et al., Van Egmond, O'Rear et al., Reyes, Wainwright, Tonkovich '536, Shikada and Schmidt identified above that have been selected by the Examiner are not sufficient to render the Applicants' claims 1-78 obvious, and therefore unpatentable, for the reasons indicated below. In making these rejections the Examiner has cherry picked various teachings from each reference to support his position, but has not indicated what rationale he has used for combining the references. In a number of passages throughout the Office Action the Examiner argues that "one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references" and cites case authority to support his position. This may be true if the combination of references upon which the rejection is based is a valid combination. However, in this case the Examiner has provided no rationale for combining the references and, as such, it is proper to attack each reference individually to demonstrate that there was no rationale for combining the references other than the Examiner's hindsight speculation based on the Applicants' disclosure, which is not a proper rationale for combining the references.

Ward et al. is cited against claims 1-78. Ward et al. discloses a microchannel device and a method of use wherein a reaction microchamber is in thermal contact with a heat exchange channel. An equilibrium limited exothermic chemical process is conducted in the reaction microchamber. Heat is transferred to the heat exchange channel to lower the temperature in the reaction microchamber and thereby increase at least one

performance parameter of the exothermic chemical process relative to isothermal operation.

The Examiner admits that Ward et al. fail to teach the formation of an intermediate product composition in a first reaction zone with a first catalyst and a final product in a second reaction zone, as specified in the Applicants' claims 1-78.

Additionally, Ward et al. does not suggest the use of a first reaction zone and a second reaction zone in the same microchannel of a microchannel reactor wherein the reaction zones are separated by a non-reactive zone not containing catalyst and where the intermediate product is heated or cooled, as specified in the Applicants' amended claims 1, 69 and 73. Thus, the requirements of independent claims 1, 69 and 73 are not suggested by the teachings in Ward et al.

Claims 2-68 and 75-77 depend from claim 1 and are distinguishable from the teachings in Ward et al. for at least the same reasons as claim 1. Claims 70-72 depend from claim 69 and are distinguishable from the teachings in Ward et al. for at least the same reasons as claim 69.

Claim 74 is directed to a process for conducting a dimethyl ether synthesis reaction wherein in a first reaction zone in a microchannel reactor the approach to equilibrium for the conversion of CO is from about 75% to about 95%, and the approach to the equilibrium for the conversion of CO in another reaction zone is from about 75% to about 95%. This is not suggested by the teachings in Ward et al.

Claim 78 is directed to a process for conducting an equilibrium limited chemical reaction in a microchannel reactor employing a first reaction zone and another reaction zone wherein the first reaction zone is heated or cooled by a first set of heat exchange channels and the another reaction zone is heated or cooled by another set of heat exchange channels. The first set of heat exchange channels is separate from the another set of heat exchange channels. This is not suggested by the teachings in Ward et al.

The Examiner contends that Ward et al. at page 26 discloses the use of sequential reactors; however, the cited passage indicates that there is "no intervening cooling" between the reactors (see, Ward et al. at page 26, lines 5-7). This is contrary to the requirements of the Applicants' independent claims 1, 69 and 73 wherein it is specified that

the intermediate product composition is heated or cooled in a non-reactive zone in the process microchannel between the first reaction zone and the second reaction zone.

The Examiner contends that Ward et al. "teach a process for methanol synthesis (page 27) wherein the reactions are equilibrated to 90% conversion (page 13)." It is respectfully submitted that this is a mischaracterization of the teachings in Ward et al. Methanol synthesis as well as other reactions are listed on page 27 of Ward et al. as being useful with the process disclosed therein. However, the process disclosed on page 13 where a 90% conversion is referred to is a water gas shift (WGS) reaction, not a methanol synthesis reaction. The 90% conversion referred to on page 13 was taken from the plot shown in Figure 1 which is used to illustrate the dependence of the reaction rate on temperature for the WGS reaction. This plot indicates that the reaction rate dropped by over three orders of magnitude by the time 90% conversion was reached. The 90% conversion value referred to in this passage is for overall conversion, not for "approach to equilibrium" which is specified in the Applicants' claims 1-78.

The statement that Ward et al. teaches, at page 14, lines 14-17, "90% conversion for each reactor" is also a mischaracterization of the teachings in Ward et al. In this passage Ward et al. is describing an alternate temperature trajectory profile for conducting a steam methane reforming reaction in a single reactor wherein the reaction is operated isothermally in the initial stage of the reactor and then followed by an optimal thermal profile. The reference indicates that by following this procedure the reactor size would be increased by 12% for a 90% conversion reactor with a steam reformate stream at 350°C. The only mention of two reactors follows the cited passage wherein at page 14, lines 19-24, Ward et al. states:

> Advantages can be realized by using one or more reactors with controlled temperature trajectories as compared to two adiabatic reactors with intercooling, which is the typical approach used in fuel reforming. In the case of adiabatic reactors with intercooling, reactor productivity is maximized for a given total conversion by optimizing the two inlet temperatures and the amount of conversion in the first reactor.

In contrast, with the process specified in the Applicants' claims 1-78 there is active heat exchange between each reaction zone and a heat exchanger and, as such, these reactions

are not adiabatic. Also, the 90% conversion value referred to in this passage is for overall conversion, not for "approach to equilibrium" which is specified in the Applicants' claims 1-78.

The Examiner admits that Ward et al. fail to teach the formation of an intermediate product composition in a first reaction zone with a first catalyst and a final product in a second reaction zone, as specified in the Applicants' claims 1-78, but cites O'Rear et al. in contending that it discloses "a process for methanol synthesis wherein an intermediate is formed in a first reaction zone with a first catalyst and a final product is formed in a second reaction zone." The teachings in O'Rear et al. are clearly distinguishable from the requirements of the Applicants' claims 1-78. O'Rear et al. disclose a dual functional syngas conversion wherein syngas is converted to high molecular weight products via a methanol intermediate. Two different types of catalysts are used. A methanol intermediate is formed with the first catalyst. The methanol intermediate is then rapidly consumed over the second catalyst during the formation of the final products which are higher molecular weight products. In contrast, Applicants' claims 1-78 specify a multi-step process conducted in a microchannel wherein a first reaction is conducted in a first reaction zone in the microchannel to form an intermediate product composition that includes the desired final product (e.g., methanol), and another reaction is conducted in another reaction zone in the same microchannel to form a final product composition that contains more of the desired final product (e.g., methanol).

The Examiner also cites Reyes for its disclosure of a multistage process. Reyes discloses a multistage catalystic partial oxidation process for oxidizing a hydrocarbon feedstream comprising C_1-C_4 hydrocarbons, with an oxygen-containing feedstream to produce a product comprising CO and H_2, also known as synthesis gas. The total oxygen requirement for the process is introduced incrementally, the first of the incremental additions taking place in the first reaction stage, and subsequent incremental additions taking place in each of the subsequent reaction stages. Each reaction stage contains a partial oxidation catalyst. The reference contains no disclosure relating to determining the equilibrium conversion value for a reactant and conducting the reaction in a microchannel wherein each reaction stage is in the same microchannel and the approach to equilibrium is at least about 5% as specified in the Applicants' independent claims 1 and 78, or at least about 40% as specified in the Applicants' independent claim 69. Independent claim 73 is

distinguishable from the teachings in this reference by specifying a process for making methanol. Independent claim 74 is distinguishable from the teachings in this reference by specifying a process for making dimethyl ether.

The Examiner admits that Ward et al. "fail to teach the temperature of the process," but cites Van Egmond for its disclosure of a methanol synthesis reaction at a temperature in the range of 150-450°C. Van Egmond is cited against the Applicants' claims 1-73 and 75-78. Van Egmond et al. discloses a process wherein a methanol synthesis system is integrated with a methanol to olefin reaction system. This is clearly distinguishable from the process specified in the Applicants' claims 1-73 or 75-78. The Applicants' claims specify a multi-step process conducted in a microchannel wherein a first reaction is conducted in a first reaction zone in the microchannel to form an intermediate product composition that includes the desired final product (e.g., methanol), and another reaction is conducted in another reaction zone in the same microchannel to form a final product composition that contains more of the desired final product (e.g., methanol). Thus, the skilled artisan designing the Applicants' claimed process would not look to the teachings in Van Egmond since the process disclosed therein is different.

The Examiner admits that Ward et al. "fail to teach limitations including reaction time and pressure," but cites Brophy for its disclosure of a methanol synthesis where the claimed pressure and contact time are employed. However, as indicated above, Brophy is not available as a prior art reference against the subject application.

Wainwright et al. is cited against claims 1-78 to support the contention that it is known that specific catalysts are capable of producing both methanol and dimethyl ether depending on the conditions of the reactions. Wainwright et al. discloses a catalyst which is used to produce methanol or a mixture of methanol and dimethyl ether. This reference contains no disclosure supporting the use of this catalyst in a microchannel having at least two reaction zones wherein the catalyst was used in each reaction zone, as specified in the Applicants' claims 1-78.

The Examiner admits that Ward et al. fails to teach that the reaction zones are separated by a non-reactive zone, but cites Tonkovich '536 for its disclosure in Fig. 2(d) of a microchannel reactor configuration wherein a heat exchanger is disposed between two reactors. However, the microchannel reactor disclosed in Fig. 2(d) of Tonkovich '536 does

not employ a microchannel containing two reaction zones as specified in the Applicants' claims 1-78.

The Examiner admits that Ward et al. fails to teach a method for making dimethyl ether, but cites Shikada against claim 74 contending that it "teach a method of making dimethyl ether (col. 1) wherein carbon monoxide and hydrogen are flowed through a two reactor process wherein dimethyl ether is produced in both reactors (col. 4)." Shikada discloses an apparatus for producing dimethyl ether comprising: a slurry-bed reactor filled with a dimethyl ether synthesis catalyst and a medium oil therefor; a condenser for condensing a gasified medium oil discharged from the reactor; an adsorber for removing a catalyst-deactivation ingredient from the medium oil condensed in the condenser; and recycle means for recycling the medium oil to the slurry-bed reactor. This is not the same as the process specified in the Applicants' claim 74 wherein the reaction is conducted in a microchannel, a first reaction being conducted in a first reaction zone in the microchannel and another reaction being conducted in another reaction zone in the same microchannel.

In the rejection of claims 75-77, the Examiner contends that if Ward et al. fails to teach the limitations of these claims, such limitations are taught by Tonkovich. However, the Examiner did not specify which Tonkovich was being relied on, Tonkovich '536 or Tonkovich '505. As noted above, Tonkovich '505 is not available as prior art. Clarification is requested.

The Examiner cited Schmidt in his rejection of claims 75-77. In this rejection the Examiner contends that Schmidt et al. teach a method of oxidation of hydrocarbons wherein the claimed SLPM and contact time is known for conversion reactions. Schmidt et al., however, does not disclosure or suggest conducting the reaction in a microchannel reactor comprising at least one process microchannel wherein a first reaction zone and another reaction zone are positioned in the same process microchannel and these reaction zones are separated by a non-reactive zone not containing catalyst as specified in claims 75-77.

The Examiner has cited various combinations of references in making his rejections. However, the Examiner has not provided any rationale for combining these references or for concluding that the Applicants' claims 1-78 are obvious. The reasons provided by the Examiner as to why the Applicants' claims would have been obvious represent nothing

more than conclusionary statements. On the other hand, following the Supreme Court's decision in *KSR International v. Teleflex Inc.*, the USPTO has stated in section 2141 of the MPEP that the key to supporting any rejection under 35 U.S.C. §103 is a clear articulation of the reasons why the claimed invention would have been obvious. In this section of the MPEP, the USPTO stated:

> The Supreme Court in *KSR* noted that the analysis supporting a rejection under 35 U.S.C. 103 should be made explicit. the court quoting *In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006), stated that "'[R]ejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.'" *KSR*, 550 U.S. at ____, 82 USPQ2d at 1396. Exemplary rationales that may support a conclusion of obviousness include:
>
> (A) Combining prior art elements according to known methods to yield predictable results;
>
> (B) Simple substitution of one known element for another to obtain predictable results;
>
> (C) Use of known technique to improve similar devices (methods, or products) in the same way;
>
> (D) Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;
>
> (E) "Obvious to try" - choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;
>
> (F) Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations would have been predictable to one of ordinary skill in the art;
>
> (G) Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

The Examiner has not indicated that any of the foregoing rationales were used in the rejection of claim 1-78.

Withdrawal of the rejection of claims 1-78 is believed to be warranted and is respectfully requested.

Applicants respectfully submit that the application is in condition for allowance. A Notice of Allowance is respectfully requested. In the event the Examiner would like to discuss any matters concerning this application, he is invited to contact the undersigned attorney by telephone. Any fees required for the filing of this paper may be charged to Deposit Account Number 18-0988.

Respectfully submitted,

RENNER, OTTO, BOISSELLE & SKLAR, LLP

By_____
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NOVEMBER 19, 2004

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BRIEF: ASSIGNMENT OF ASSIGNOR'S INTEREST (SEE DOCUMENT FOR DETAILS).

ASSIGNOR:
BROPHY, JOHN H. DOC DATE: 10/15/2003

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PESA, FREDERICK A. DOC DATE: 10/22/2003

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SERIAL NUMBER: 10429286 FILING DATE: 05/02/2003
PATENT NUMBER: ISSUE DATE:
TITLE: PROCESS FOR CONVERTING A HYDROCARBON TO AN OXYGENATE OR A NITRILE

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John H. Brophy; Frederick A. Pesa; Anna Lee Tonkovich; Jeffrey S. McDaniel; Kai Tod Paul Jarosch

Additional name(s) of conveying party(ies) attached? [ ] Yes [x] No

2. Name and address of receiving party(ies):

Name: Velocys, Inc.

Internal Address: 5,2704

Street Address: 7950 Corporate Blvd.

City: Plain City

State/Country: OH ZIP: 43064

Additional name(s) & address(es) attached? [ ] Yes [x] No

3. Nature of conveyance:

[x] Assignment [ ] Merger

[ ] Security Agreement [ ] Change of Name

[ ] Other

Execution Date: 9/10;9/30;10/8;10/15&10/22/03

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If this document is being filed together with a new application, the execution date of the application is:

A. Patent Application No.(s)

10/429,286

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5. Name and address of party to whom correspondence concerning document should be mailed:

Name: Neil A. DuChez

Internal Address: Renner, Otto, Boisselle & Sklar

Street Address: 1621 Euclid Avenue
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City: Cleveland

State: Ohio ZIP: 44115

6. Total number of applications and patents involved: [1]

7. Total fee (37 CFR 3.41) .....$ 40.00

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ASSIGNMENT

For One Dollar ($1.00) and other good and valuable consideration, receipt of which is hereby acknowledged, we the undersigned

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hereby sell, transfer and assign to Velocys, Inc., a corporation of Delaware having a place of business at 7950 Corporate Boulevard, Plain City, Ohio 43064 USA, its successors and assigns, the entire right, title and interest, so far as concerns the United States and the Territories and Possessions thereof and all foreign countries, in and to the inventions in

PROCESS FOR CONVERTING A HYDROCARBON TO AN OXYGENATE OR A NITRILE

set forth in the application for United States Letters Patent, Serial No. 10/429,286, said application for United States Letters Patent, any and all other applications for Letters Patent on said inventions in countries foreign to the United States, including all divisional, renewal, substitute, continuation and Convention applications based in whole or in part upon said inventions or upon said applications, and any and all Letters Patent and reissues and extensions of Letters Patent granted for

said inventions or upon said applications, and every priority right that is or may be predicated upon or arise from said inventions, said applications and said Letters Patent; said assignee being hereby authorized to file patent applications in any or all countries on any or all said inventions in the name of the undersigned or in the name of said assignee or otherwise as said assignee may deem advisable, under the International Convention or otherwise; the Commissioner of Patents of the United States of America and the empowered officials of all other governments being hereby authorized to issue or transfer all said Letters Patent to said assignee in accordance herewith; this assignment being under covenant, not only that full power to make the same is had by the undersigned, but also that such assigned right is not encumbered by any grant, license, or other right heretofore given, and that the undersigned will do all acts reasonably serving to assure that the said inventions, patent applications and Letters Patent shall be held and enjoyed by said assignee as fully and entirely as the same could have been held and enjoyed by the undersigned if this assignment had not been made, and particularly to execute and deliver to said assignee all lawful documents including petitions, specifications, oaths, assignments, invention disclaimers, and lawful affidavits in form and substance which may be requested by said assignee, to furnish said assignee with all facts relating to said inventions or the history thereof and any and all documents, photographs, models, samples or other physical exhibits which may be useful for establishing the facts of conception, disclosure and reduction to practice of said inventions, and to testify in any proceedings relating to said inventions, patent applications and Letters Patent.

Attested by:	Signed:	Date:
	John H. Brophy	
	Frederick A. Pesa	
Delda Harbour	Anna Lee Tonkovich	9/30/03
Delda Harbour	Jeffrey S. McDaniel	10/6/03
Delda Harbour	Kai Tod Paul Jarosch	09/10/03

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Attested by:	Signed:	Date:
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PROCESS FOR CONVERTING A HYDROCARBON TO AN OXYGENATE OR A NITRILE

set forth in the application for United States Letters Patent, Serial No. 10/429,286, said application for United States Letters Patent, any and all other applications for Letters Patent on said inventions in countries foreign to the United States, including all divisional, renewal, substitute, continuation and Convention applications based in whole or in part upon said inventions or upon said applications, and any and all Letters Patent and reissues and extensions of Letters Patent granted for

said inventions or upon said applications, and every priority right that is or may be predicated upon or arise from said inventions, said applications and said Letters Patent; said assignee being hereby authorized to file patent applications in any or all countries on any or all said inventions in the name of the undersigned or in the name of said assignee or otherwise as said assignee may deem advisable, under the International Convention or otherwise; the Commissioner of Patents of the United States of America and the empowered officials of all other governments being hereby authorized to issue or transfer all said Letters Patent to said assignee in accordance herewith; this assignment being under covenant, not only that full power to make the same is had by the undersigned, but also that such assigned right is not encumbered by any grant, license, or other right heretofore given, and that the undersigned will do all acts reasonably serving to assure that the said inventions, patent applications and Letters Patent shall be held and enjoyed by said assignee as fully and entirely as the same could have been held and enjoyed by the undersigned if this assignment had not been made, and particularly to execute and deliver to said assignee all lawful documents including petitions, specifications, oaths, assignments, invention disclaimers, and lawful affidavits in form and substance which may be requested by said assignee, to furnish said assignee with all facts relating to said inventions or the history thereof and any and all documents, photographs, models, samples or other physical exhibits which may be useful for establishing the facts of conception, disclosure and reduction to practice of said inventions, and to testify in any proceedings relating to said inventions, patent applications and Letters Patent.

Attested by:	Signed:	Date:
_____	_____	_____
	John H. Brophy	
Nick Pesa	Frederick A. Pesa	14/22/03
_____	_____	_____
	Anna Lee Tonkovich	
_____	_____	_____
	Jeffrey S. McDaniel	
_____	_____	_____
	Kai Tod Paul Jarosch	

UNITED STATES
PATENT AND
TRADEMARK OFFICE

Under Secretary of Commerce For Intellectual Property and
Director of the United States Patent and Trademark Office
Washington, DC 20231
www.uspto.gov

APRIL 23, 2003

PTAS

RENNER, OTTO, BOISSELLE & SKLAR, LLP
NEIL A. DUCHEZ
1621 EUCLID AVENUE
19TH FLOOR
CLEVELAND, OH 44115

UNITED STATES PATENT AND TRADEMARK OFFICE
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RECORDATION DATE: 12/17/2002 REEL/FRAME: 013591/0418
NUMBER OF PAGES: 4

BRIEF: ASSIGNMENT OF ASSIGNOR'S INTEREST (SEE DOCUMENT FOR DETAILS).

ASSIGNOR:
TONKOVICH, ANNA LEE DOC DATE: 11/01/2002

ASSIGNOR:
SIMMONS, WAYNE W. DOC DATE: 11/04/2002

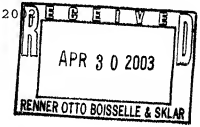
ASSIGNOR:
JAROSCH, KAI TOD PAUL DOC DATE: 11/09/2002

ASSIGNOR:
MAZANEC, TERRY DOC DATE: 11/06/2002

ASSIGNOR:
DAYMO, ERIC DOC DATE: 10/31/2002

ASSIGNOR:
PENG, YING DOC DATE: 10/31/2002

ASSIGNOR:
MARCO, JENNIFER LYNNE DOC DATE: 10/31/20



ASSIGNEE:
VELOCYS, INC.
7950 CORPORATE BOULEVARD
PLAIN CITY, OHIO 43064

SERIAL NUMBER: 10219956
PATENT NUMBER:

FILING DATE: 08/15/2002
ISSUE DATE:

MARCUS KIRK, EXAMINER
ASSIGNMENT DIVISION
OFFICE OF PUBLIC RECORDS

FORM PTO-1595
(REV 6-93)

OMB No. 0651-011 (exp.4/94)

DEC. 17 2002 PATENT & TRADEMARK OFFICE

12-23-2002

102319550

U.S. DEPARTMENT OF COMMERCE
Patent and Trademark Office

02-051

To the Honorable Commissioner of Patents and Trademarks: Please record the attached original documents or copy thereof.

1. Name of conveying party(ies):

Anna Lee Tonkovich; Wayne W. Simmons; Kai Tod Paul Jarosch; Terry Mazanec; Eric Bayuzick; Ying Peng; Jennifer Lynne Marco

12/17/02

Additional name(s) of conveying party(ies) attached? [ ] Yes [x] No

DEC 17 2002 PATENT & TRADEMARK OFFICE

2. Name and address of receiving party(ies):

Name: Velocys, Inc.

Internal Address:

Street Address: 7950 Corporate Boulevard

City: Plain City

State/Country: Ohio ZIP: 43064

Additional name(s) & address(es) attached? [ ] Yes [ ] No

3. Nature of conveyance:

[x] Assignment [ ] Merger

[ ] Security Agreement [ ] Change of Name

[ ] Other

Execution Date: 10/31;11/1;11/4;11/6;11/9/02

4. Application number(s) or patent number(s):

If this document is being filed together with a new application, the execution date of the application is:

A. Patent Application No.(s)

10/219,956

B. Patent No.(s)

Additional Numbers attached? [ ] Yes [x] No

5. Name and address of party to whom correspondence concerning document should be mailed:

Name: Neil A. DuChez

Internal Address: Renner, Otto, Boisselle & Sklar, LLP

Street Address: 1621 Euclid Avenue
19th Floor

City: Cleveland

State: Ohio ZIP: 44115

6. Total number of applications and patents involved: [1]

7. Total fee (37 CFR 3.41) .....$ 40.00

[x] Enclosed

[ ] Authorized to be charged to deposit account

8. Deposit account number:

(Attach duplicate copy of this page if paying by deposit account)

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9. Statement and signature.

To the best of my knowledge and belief, the foregoing information is true and correct and any attached copy is a true copy of the original document.

Neil A. DuChez
Name of Person Signing

Signature

12/10/02
Date

Reg. No. 26,725 Total number of pages including cover sheet attachments, and document: [4]

Mail documents to be recorded with required cover sheet information to:
Commissioner of Patents & Trademarks, Box Assignments
Washington, D.C. 20231

12/18/2002 SMINASS1 00000084 10219956
04 FC:8021 40.00 OP

ASSIGNMENT

For One Dollar ($1.00) and other good and valuable consideration, receipt of which is hereby acknowledged, we the undersigned

Anna Lee Tonkovich
11875 Rausch Road
Marysville, Ohio 43040
Citizenship: USA

Wayne W. Simmons
8870 Tartan Fields Drive
Dublin, Ohio 43017
Citizenship: USA

Kai Tod Paul Jarosch
839 Vernon Road
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Citizenship: Canada

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Eric Daymo
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Citizenship: USA

Ying Peng
1280 Bunkerhill Blvd.
Apartment A
Columbus, Ohio 43220
Citizenship: China

Jennifer Lynne Marco
10068 South Charleston Pike
South Charleston, Ohio 45368
Citizenship: USA

hereby sell, transfer and assign to Velocys, Inc., a corporation of Delaware having a place of business at 7950 Corporate Boulevard, Plain City, Ohio 43064 USA, its successors and assigns, the entire

right, title and interest, so far as concerns the United States and the Territories and Possessions thereof and all foreign countries, in and to the inventions in

PROCESS FOR CONDUCTING AN EQUILIBRIUM LIMITED CHEMICAL REACTION IN A SINGLE STAGE PROCESS CHANNEL

set forth in the application for United States Letters Patent, Serial No. 10/219,956, said application for United States Letters Patent, any and all other applications for Letters Patent on said inventions in countries foreign to the United States, including all divisional, renewal, substitute, continuation and Convention applications based in whole or in part upon said inventions or upon said applications, and any and all Letters Patent and reissues and extensions of Letters Patent granted for said inventions or upon said applications, and every priority right that is or may be predicated upon or arise from said inventions, said applications and said Letters Patent; said assignee being hereby authorized to file patent applications in any or all countries on any or all said inventions in the name of the undersigned or in the name of said assignee or otherwise as said assignee may deem advisable, under the International Convention or otherwise; the Commissioner of Patents of the United States of America and the empowered officials of all other governments being hereby authorized to issue or transfer all said Letters Patent to said assignee in accordance herewith; this assignment being under covenant, not only that full power to make the same is had by the undersigned, but also that such assigned right is not encumbered by any grant, license, or other right heretofore given, and that the undersigned will do all acts reasonably serving to assure that the said inventions, patent applications and Letters Patent shall be held and enjoyed by said assignee as fully and entirely as the same could have been held and enjoyed by the undersigned if this assignment had not been made, and particularly to execute and deliver to said assignee all lawful documents including petitions, specifications, oaths, assignments, invention disclaimers, and lawful affidavits in form and substance which may be requested by said assignee, to furnish said assignee with all facts relating to said inventions or the history thereof and any and all documents, photographs, models, samples or other physical exhibits which may be useful for establishing the facts of conception, disclosure and reduction to practice of said inventions, and to testify in any proceedings relating to said inventions, patent applications and Letters Patent.

Attested by:	Signed:	Date:
Bonnie M. Snodgrass	Anna Lee Tonkovich	11/1/02
Bonnie M. Snodgrass	Wayne W. Simmons	11/4/02
Bonnie M. Snodgrass	Kai Tod Paul Jarosch	11/09/02
Bonnie M. Snodgrass	Terry Mazanec	6 NOV 02

Attested by:	Signed:	Date:
Bonnie M. Snedgen	Eric Daymo	10/31/02
Bonnie M. Snedgen	Xing Peng	10/31/02
Bonnie M. Snedgen	Jennifer Lynne Marco	10-31-02

UNITED STATES PATENT AND TRADEMARK OFFICE

UNDER SECRETARY OF COMMERCE FOR INTELLECTUAL PROPERTY AND
DIRECTOR OF THE UNITED STATES PATENT AND TRADEMARK OFFICE

DECEMBER 16, 2004

PTAS

102769621A

RENNER, OTTO, BOISSELLE & SKLAR
NEIL A. DUCHEZ
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19TH FLOOR
CLEVELAND, OH 44115

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RECORDATION DATE: 06/14/2004

REEL/FRAME: 015461/0406
NUMBER OF PAGES: 3

BRIEF: ASSIGNMENT OF ASSIGNOR'S INTEREST (SEE DOCUMENT FOR DETAILS).
DOCKET NUMBER: VELOP0115

ASSIGNOR: TONKOVICH, ANNA LEE	DOC DATE: 06/04/2004
ASSIGNOR: JAROSCH, KAI TOD PAUL	DOC DATE: 06/04/2004
ASSIGNOR: MAZANEC, TERRY	DOC DATE: 06/08/2004
ASSIGNOR: DALY, FRANCIS P.	DOC DATE: 06/03/2004
ASSIGNOR: TAHA, RACHID	DOC DATE: 06/03/2004
ASSIGNOR: ALBA, ENRIQUE ACEVES DE	DOC DATE: 06/08/2004

ASSIGNEE:
VELOCYS, INC.
7950 CORPORATE BLVD.
PLAIN CITY, OHIO 43064

SERIAL NUMBER: 10777033 FILING DATE: 02/11/2004
PATENT NUMBER: ISSUE DATE:
TITLE: PROCESS FOR CONDUCTING AN EQUILIBRIUM LIMITED CHEMICAL REACTION USING MICROCHANNEL TECHNOLOGY

VIOLET MCCOY, EXAMINER
ASSIGNMENT DIVISION
OFFICE OF PUBLIC RECORDS

FORM PTO-1595
(REV 6-93)
OMB No. 0651-0011 (exp.4/94)

06-18-2001

102769621

U.S. DEPARTMENT OF COMMERCE
Patent and Trademark Office

VELOP0115US

To the Honorable Commissioner of Patents: Please record the attached original documents or copy thereof.

1 Name of conveying party(ies):

Anna Lee Tonkovich; Kai Tod Paul Jarosch; Terry Mazanec; Francis P. Daly; Rachid Taha; Enrique Aceves de Alba

Additional name(s) of conveying party(ies) attached? [ ] Yes [x] No

2. Name and address of receiving party(ies):

Name: Velocys, Inc.

Internal Address:

Street Address: 7950 Corporate Blvd.

City: Plain City

State/Country: Ohio ZIP: 43064

Additional name(s) & address(es) attached? [ ] Yes [x] No

3. Nature of conveyance:

[x] Assignment [,] Merger

[ ] Security Agreement [ ] Change of Name

[ ] Other

Execution Date: 6/3;6/4 & 6/8/2004

4. Application number(s) or patent number(s):

If this document is being filed together with a new application, the execution date of the application is:

A. Patent Application No.(s)

10/777,033

B. Patent No.(s)

Additional Numbers attached? [ ] Yes [x] No

5. Name and address of party to whom correspondence concerning document should be mailed:

Name: Neil A. DuChez

Internal Address: Renner, Otto, Boisselle & Sklar

Street Address: 1621 Euclid Avenue

19th Floor

City: Cleveland

State: OH ZIP: 44115

6. Total number of applications and patents involved: [1]

7. Total fee (37 CFR 3.41) .....$ 40.00

[x] Enclosed

[ ] Authorized to be charged to deposit account

8. Deposit account number:

(Attach duplicate copy of this page if paying by deposit account)

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9. Statement and signature.

To the best of my knowledge and belief, the foregoing information is true and correct and any attached copy is a true copy of the original document.

Neil A. DuChez
Name of Person Signing

Signature

June 11, 2004
Date

Reg. No. 26,725 Total number of pages including cover sheet attachments, and document: [3]

Mail documents to be recorded with required cover sheet information to:
Commissioner of Patents & Trademarks, Box Assignments
Washington, D.C. 20231

03-020

ASSIGNMENT

For One Dollar ($1.00) and other good and valuable consideration, receipt of which is hereby acknowledged, we the undersigned

Anna Lee Tonkovich
11875 Rausch Road
Marysville, Ohio 43040
Citizenship: USA

Kai Tod Paul Jarosch
839 Vernon Road
Bexley, Ohio 43209-5420
Citizenship: Canada

Terry Mazanec
7168 Selworthy Lane
Solon, Ohio 44139
Citizenship: USA

Francis P. Daly
188 North Franklin Street
Delaware, Ohio 43015
Citizenship: USA

Rachid Taha
5458 Dunmere Lane
Dublin, Ohio 43017

Enrique Aceves de Alba
3178 Bethel Road, Apt. 108
Columbus, Ohio 43220

hereby sell, transfer and assign to Velocys, Inc., a corporation of Delaware having a place of business at 7950 Corporate Boulevard, Plain City, Ohio 43064 USA, its successors and assigns, the entire right, title and interest, so far as concerns the United States and the Territories and Possessions thereof and all foreign countries, in and to the inventions in

PROCESS FOR CONDUCTING AN EQUILIBRIUM LIMITED CHEMICAL REACTION USING MICROCHANNEL TECHNOLOGY

set forth in the application for United States Letters Patent, Serial No. 10/777,033, said application for United States Letters Patent, any and all other applications for Letters Patent on said inventions in countries foreign to the United States, including all divisional, renewal, substitute, continuation

and Convention applications based in whole or in part upon said inventions or upon said applications, and any and all Letters Patent and reissues and extensions of Letters Patent granted for said inventions or upon said applications, and every priority right that is or may be predicated upon or arise from said inventions, said applications and said Letters Patent; said assignee being hereby authorized to file patent applications in any or all countries on any or all said inventions in the name of the undersigned or in the name of said assignee or otherwise as said assignee may deem advisable, under the International Convention or otherwise; the Commissioner of Patents of the United States of America and the empowered officials of all other governments being hereby authorized to issue or transfer all said Letters Patent to said assignee in accordance herewith; this assignment being under covenant, not only that full power to make the same is had by the undersigned, but also that such assigned right is not encumbered by any grant, license, or other right heretofore given, and that the undersigned will do all acts reasonably serving to assure that the said inventions, patent applications and Letters Patent shall be held and enjoyed by said assignee as fully and entirely as the same could have been held and enjoyed by the undersigned if this assignment had not been made, and particularly to execute and deliver to said assignee all lawful documents including petitions, specifications, oaths, assignments, invention disclaimers, and lawful affidavits in form and substance which may be requested by said assignee, to furnish said assignee with all facts relating to said inventions or the history thereof and any and all documents, photographs, models, samples or other physical exhibits which may be useful for establishing the facts of conception, disclosure and reduction to practice of said inventions, and to testify in any proceedings relating to said inventions, patent applications and Letters Patent.

Attested by:	Signed:	Date:
Nelda Harbour	Anna Lee Tonkovich	6-04-04
Nelda M Harbour	Kai Tod Paul Jarosch	June 4th 2004
Nelda M Harbour	Terry Mazanec	8 JUNE '04
Nelda M Harbour	Francis P. Daly	6-3-04
Nelda M Harbour	Rachid Taha	6-03-04
RACHID TAHA	Enrique Aceves de Alba	8/June/2004
Nelda Harbour		